

## Newsletter #2


**DIGICOR**
[www.digicor-project.eu](http://www.digicor-project.eu)


## 11 European organisations at the second project review

# First 2 years of DIGICOR

by Arnd Schirrmann - DIGICOR Project Coordinator (Airbus)

In 2016 a group of 11 European companies and research institutes started the H2020 project DIGICOR (Decentralised Agile Coordination Across Supply Chains; [www.digicor-project.eu](http://www.digicor-project.eu)). DIGICOR aims to reduce the burden to set-up production networks and collaboration between SMEs, to shorten the time to jointly respond to business opportunities and to enter supply chains of large manufacturers and will simplify the management and control of production and logistics execution.

In newsletter #1 in 2017, first year of DIGICOR, we addressed the first technical results in development of the DIGICOR platform architecture and the detailed derivation of use cases for the Aerospace and Automotive industrial end-users. Also the third industrial use case for the factory automation at Comau was defined.

Now in the second year of DIGICOR, the implementation work of the DIGICOR collaboration platform has progressed and two software releases have been published. These releases include the platform and the tools for planning, scheduling and risk assessment. Beside the technical work, also the first service concepts and business models for the operation of the digital platform by Aerospace and Automotive suppliers were defined. This is current-

ly under discussion with end users from Hanse Aerospace in Germany and SME Cluster in the United Kingdom. Work on standardisation has also started, where the DIGICOR standard landscape has been defined.

In March 2018, project results up to that point were successfully presented and reviewed by European Commission and experts in Prague. Furthermore, publications at international conferences and in scientific journals have been used for disseminating DIGICOR outcomes, engaging with both industrial and scientific communities, and discussing the way ahead.

In the final project year that is starting now, DIGICOR will complete the implementation of the collaboration platform and tools to a fully running prototype. Main focus will be the completion of the already started validation and demonstration of the project outcomes in close interaction with the external community of potential end users.

I am looking forward for the coming year of exciting research work together with our DIGICOR consortium, supported by the European Commission and a growing community of external partners. We will keep you informed on DIGICOR progress.

## In this issue ...



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A brief report on the 2nd project review on progress for the first 18 months of the project.

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Discover what a survey with SMEs reveals about the aerospace industry

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# DIGICOR at the Farnborough International Airshow — FIA 2018

by Ingo Martens (Hanse-Aerospace Wirtschaftsdienst)

The Farnborough International Airshow is one of the largest industry events in aerospace. This year the event took place from 16 to 21 July 2018 with more than 80,000 visitors and more than 1,500 industrial exhibitors, providing a good arena to disseminate DIGICOR.

Indeed, project partners had the opportunity to engage in an intensive exchange with suppliers from the aviation industry. The general possibilities of the DIGICOR platform as well as the associated business models were discussed. This provided valuable insights for further developments of the prototype and for the business models that could be accepted by potential suppliers in the aviation industry.

For Hanse-Aerospace SME members, for example, the most important objective is to focus on the functionalities for participating in a tender and for forming a collaborative consortium. DIGICOR takes these suggestions as input for improving both areas in the prototype. Therefore,

*DIGICOR partner Hans-Aerospace explained the expected benefits of DIGICOR platform*

for aviation applications these be implemented and supported.

The aim of DIGICOR participation in the Airshow was to discuss the current platform prototype and future functionalities. Comments and suggestions made by suppliers are taken into account for the next release of the platform prototype. Such a prototype will be demonstrated in a workshop with other suppliers in autumn 2018 to ensure that past suggestions are taken as practical requirements and actually implemented, increasing the likelihood of DIGICOR uptake after the project ends.



## It's all about business collaboration: DIGICOR Portal

by Arnd Schirrmann (Airbus)

One of the starting premises for developing DIGICOR platform and tools is the easiness to visualize and identify collaborations. This premise was embedded from the beginning into our software developers. Therefore, we decided to based all the design on a common, user-centered, look-and-feel portal.

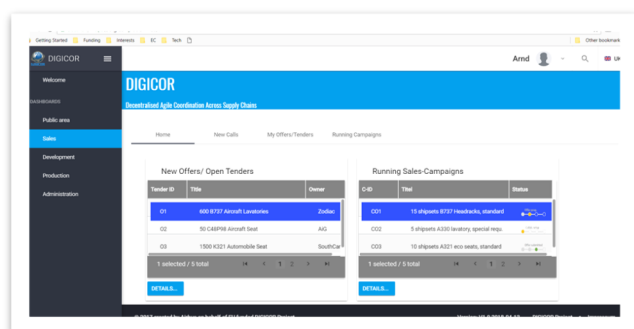
DIGICOR portal is the landing place when a user visits and registers in the platform. It consists of an area where users can vis-

ualise a catalogue of tools available to install. These tools include, as the basic ones, tendering process, production planning, shop floor scheduling, risk assessment, and factory connectors to monitor manufacturing machines.

Current version of the portal allows the user to try prototype versions of these tools, including the monitoring of a full supply chain of a placed order.

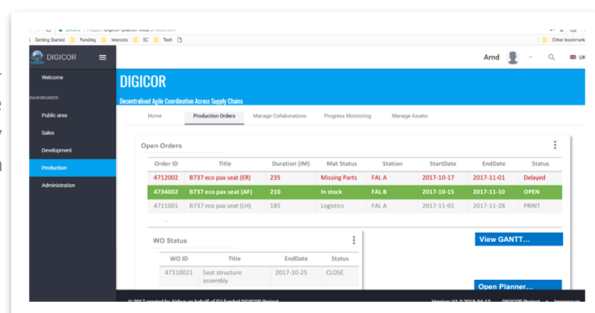
This functionality enables manufacturers to detect potential delays in the supply chain and plan accordingly.

The final version portal is still being implemented. Work progresses incrementally while accommodating new suggestions from potential users. There is still work to be done on the portal, but it is already building up promising outcomes.



Existing collaborations are visible across the supply chain

Open collaborations presented in an easy-to-see way





# Successful 2nd Project Review

by Cesar Marin (Information Catalyst for Enterprise)

Last April 2018 the second technical review meeting took place in Prague, Czech Republic, hosted by Czech Technical University. The meeting consisted of presenting the current status of the project covering all aspects, from technical and scientific to live demonstrations; from business models and dissemination through to project financial figures.

The technical and scientific aspects presented in the review meeting included a technical roadmap of current achievements and future developments; it also included three demonstration of different functionalities of the platform and tools:

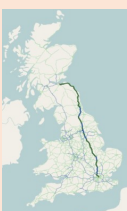
- A Lego cube was manufactured by two assembling robots using OPC UA communication
- Monitoring of a manufacturing process including a machine located in Wales. This was demonstrated using the SME Cluster platform that is expected to use the DIGICOR platform after the end of the project
- Monitoring specific equipment at Comau in Italy.

Additionally, a set of business models were presented. These business models were created as an initial way to explore the different ways to exploit the platform after DIGICOR project finishes. Among the models presented we find the following:

- Full membership. Full access throughout the year to all areas of the portal.
- Partial membership. A reduced fee is paid giving access to a fixed set of tools. Access to more tools is possible by additional payment.
- Pay as you go. Free access to the public area with the possibility to access

## Did you know...?

- ◇ If all the wiring in an Airbus A380 was laid end to end, it would stretch 320 miles. This is the same travel distance from Edinburgh to London
- ◇ The Airbus A380 is designed to fly for 140,000 hours. This means that it could fly around the world more than 2,000 times in its lifetime



tools after paying a fixed price. This price provides access for a limited period.

- Free membership. No fee is paid and access is possible but tools functionalities are restricted. The intention of this model is to create a need in the market.
- Initial operation costings were also presented, giving an idea of the initial investment, the access cost for subscribers, and the minimum number of subscribers needed for a profitable operation.

As part of the dissemination efforts that were reported, emphasis was made to the online reach of the project via social network channels and monthly blogs on topics and activities related to the project; also 100% of DIGICOR scientific publications are Open Access, that is, anyone from the public within Europe can access the PDF files of the publication at no cost at all. Special emphasis was made to efforts to collaborate with other manufacturing projects and the Coordination Support Action in the same unit.

The financial and effort aspects were also presented, which were indicated as going according to plan and with no foreseen deviations. This is also reflected in the risk management table.

The reviewers praised the results achieved so far. As it

is common with this type of projects, improvements can be made as reviewers made a few suggestions to improve the potential impact of results.

Finally, the reviewers suggested the consortium to concretize those few ideas and developments still in their early stages. DIGICOR is seen as both innovative and challenging project with highly promising results. This is confirmed by comments from potential end-users and it is an insight DIGICOR will not let pass.

*"I am proud of the results we got so far, but there's still a lot of work to do in the next year and a half. DIGICOR is interesting, challenging, and promising, and that keeps us motivated. As I see it, the only way to succeed is to push harder"*

-Arnd Schirrmann (Airbus),  
DIGICOR coordinator  
Interviewed in April 2018  
Prague, Czech Republic

# Lean manufacturing for collaborating companies

by Simon Osborn (Control 2K)

One of the foreseen operation modes of DIGICOR is as a collection of tools integrated in a different platform. This would allow DIGICOR to provide support to collaborating SMEs that are already organised and use IT tools that help them in other areas of manufacturing that are out of the scope of DIGICOR. That is, DIGICOR would extend the capabilities of already organised SMEs by providing support on tender participation, team formation to compete against bigger companies, and risk assessment for joining specific teams. This is precisely one of DIGICOR's use cases.

Control 2k, a DIGICOR partner, has a use case about this DIGICOR mode of operation. SMECluster Automotive is an association of SMEs in the automotive industry in Wales, UK, led by Control 2K. SMECluster members have already realised that by joining forces they can compete against bigger companies, but for them having a solid IT infrastructure that supports this collaboration is a problem.

SMECluster offers an IT platform to its members with some tools available, but nothing on collaboration at the depth, clarity, and easiness that DIGICOR provides.

Web-based, real-time virtual factory for lean manufacturing



SMECluster, via Control 2K, has a prototype implementation of a KanBan Manufacturing Tool, which helps control orders

throughout a supply chain while minimising inventory. This is done by responding to supply demands as soon as a threshold alert is received calling for more parts.

DIGICOR adds value to the KanBan Manufacturing Tool by helping create consortia of companies within SMECluster that together can supply to OEMs. DIGICOR also allows the

Control 2K has demonstrated this application live using signals from the test facility in Bridgend, UK, by utilising OPC UA protocols used by DIGICOR, with alerts displayed on the web user interface and via SMS. In addition, the status of the production area including stock levels are represented in a web based, real-time Virtual Factory.

The clear application of DIGICOR in use cases like this one, where parts of DIGICOR can be coupled with existing IT infrastructure, is appealing to associations of companies not only in the automotive industry but others as well.

## Decomposing a tender to automate matchmaking of SMEs

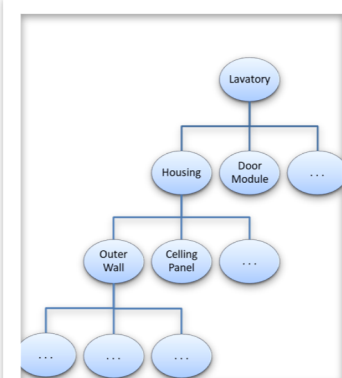
by Grigory Pishchulov & Sonia Cisneros-Cabrera (The University of Manchester)

One of the core functionalities of DIGICOR is the team composition, which would allow SMEs to jointly bid for complex tenders. The Tender Decomposition and Matchmaking Service, or TDMS, allows SMEs to find potential partners for building a consortium and jointly responding to a call for tenders (CfT).

This is accomplished by breaking down the target product and associated goals into sub-products and sub-goals in a hierarchical fashion.

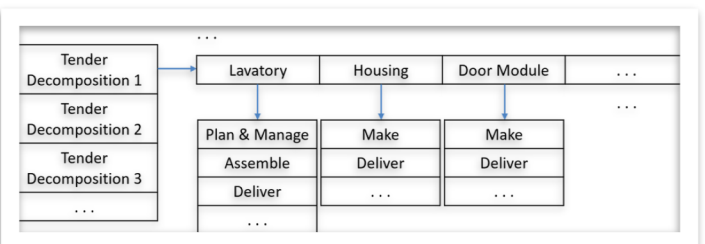
The University of

In order to do this, the tender needs to be decomposed into a number of subordinate tasks, or goals, which can be associated with the target product, its parts, or related services.



Manchester have developed a matchmaking algorithm that attempts to create suitable teams. This is done by first analysing members' capabilities while distributing sub-goals among them according to their capabilities as registered on the DIGICOR platform.

The matchmaking algorithm can be influenced to include preferred partners, which will be considered only if they meet the require-



ments of a goal in the sub-tasks. Consequently, there could be a variety of prospective teams for each tender decomposition.

Each proposed SME, as partner for a team, can be manually replaced if needed. Such action will create a new team with the selected partner as replacement. If more than one team are found, they are ranked according to their suitability for the tender submission and this list is presented...

*Continue next page ...*

...to the user for actually choosing the team. This functionality and overall user interface can be appreciated in the figure below.

Furthermore, the matchmaking criteria can generally be divided into three categories that operate in sequence:

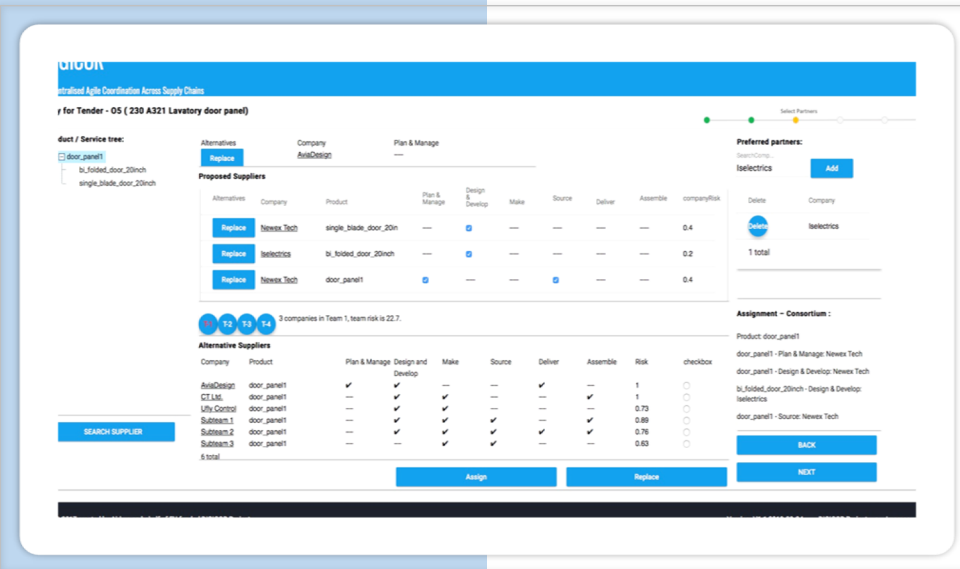
- ◆ **Exclusion criteria:** it is used to filter out non-eligible companies; it refers to a company's inability to fulfil goals associated with the target product or any of

# Aerospace industry reveals deficit for SMEs

by Ingo Martens (Hanse-Aerospace Wirtschaftsdienst)

A survey conducted within the framework of the DIGICOR project among the member companies of the German business association Hanse-Aerospace showed that SMEs are not integrated into the value chains of the major players for various reasons:

- ◆ Another problem is that SMEs do not formally meet the purchasing conditions of large manufacturers. This issue is related to production capacity where OEM orders exceed by far the SME capacity in terms of production rate within strict and short time constraints.
- ◆ They are often too small in terms of turnover and number of employees. Typically OEMs take into account a number of features for evaluation such as annual profit and company size. This form of evaluation hinders SME participation.
- ◆ In addition, SMEs cannot cope with the cost when facing risks as demanded by the customer. The typical example is when OEMs demand payment for any minor delay in production.



its parts.

- ◆ **Grouping criteria:** it is used to pre-select eligible companies into prospective teams capable of jointly meeting the CFT requirements; some of the indicators used in this category consist of joint annual turnover and certification.
- ◆ **Evaluation of team suitability:** it is used to measure how suitable a team is for fulfilling the CFT requirements; it considers geographical distribution of team members, industry branch classification, capabilities regarding technologies and materials, and the contract type.

The TDMS prototype is available and has demonstrated its innovative character.

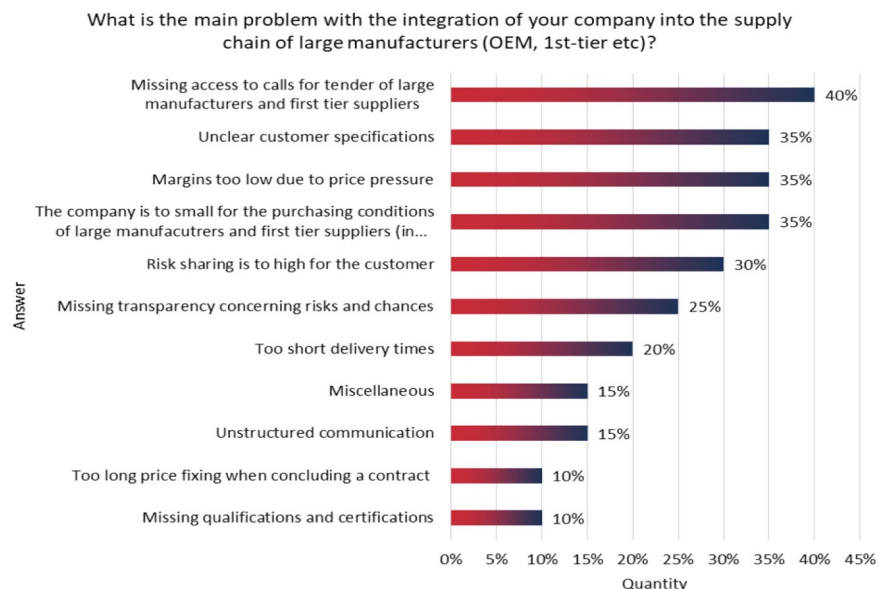
## Did you know...?

- ◆ The largest manufacturing domains in Wales are Transport Equipment (18.4%) and Food and Drink (15.1%)
- ◆ Wales has seen a 49% increase in investment in the manufacturing sector in 2018 Q2 over 2017 Q3



- ◆ Arguably the main problem as indicated by SMEs is the lack of access to tenders. OEMs tend to send these tenders through a system of theirs to which access is problematic for SMEs. Consequently, SMEs are not even given the opportunity to submit bids.

The DIGICOR platform is intended to remedy all the situations above by enabling companies, in particular SMEs, to have easy access to call for tenders, form alliances, and bid for opportunities. SMEs then can have the opportunity to be integrated into the value chains of the major OEMs.



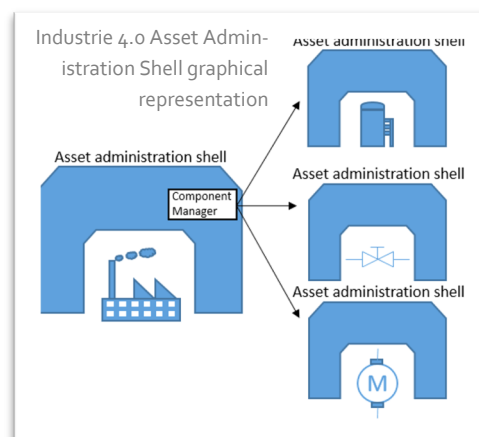


# DIGICOR standards landscape

by Georg Neugschwandtner (Fortiss)

As a Factories of the Future project, DIGICOR is not isolated from the developments happening in the manufacturing world. This includes standards relevant to the areas within DIGICOR's scope:

- ◆ ISA 95 (IEC 62264) is a standard that provides an object model for manufacturing operations management, representing operations and resources. Another way to see it is as the "business view on production". DIGICOR is using this standard as the basis for how collaborating teams report their progress upstream in a supply chain, using a consistent terminology.
- ◆ OPC UA is a standard for machine to machine communication protocol. IT is rapidly gaining attention as a standard because it provides a platform independent way of accessing data from machines on the shop floor. Since OPC UA places context information with the data, integration effort is reduced. DIGICOR is using OPC UA as the primary communication interface between shop floor data sources and all DIGICOR internal tools
- ◆ The OPC UA Companion Standards capture the domain experience of relevant industry bodies. A standard of interest to DIGICOR is the OPC UA Robotics CS which has been released last summer 2018. DIGICOR is analysing the use of this standard as a way to query current status of robots located in the shop floor via a vendor neutral interface.
- ◆ The Industrie 4.0 Asset Administration Shell (AAS) aims to standardise representations of industrial equipment in the digital world, that is, a Digital Twin. Currently, the aspects standardised focus on the plant design phase (e.g. 3D models, asset catalogue data).



As the AAS specifications expand to cover aspects of the operation phase, OPC UA was chosen as the runtime interface. The API specification of this standard has not been released yet, thus DIGICOR is waiting for this to happen in order to determine whether (and how) to incorporate it.

## Simulating the exploitation of project results

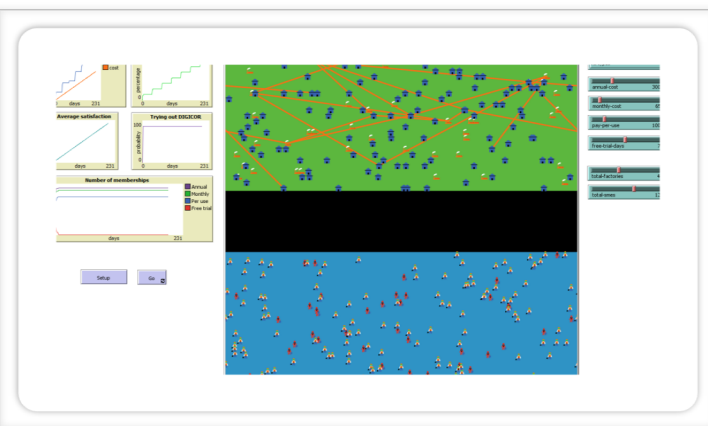
by Cesar Marin (Information Catalyst for Enterprise)

DIGICOR, like other European projects, plan to exploit project results. But apart from a business plan, DIGICOR is simulating business models and the markets where results will be exploited. Such simulations consider dynamic market conditions and variations of DIGICOR memberships with different payment amounts, frequencies, and different access types.

In order to do this, a simulator was created using NetLogo where manufacturers and suppliers can join the DIGICOR platform with a certain probability. Once registered in the platform and after choosing membership type and paying, they can post and bid for calls for tenders. Supplier selection occurs and contracts are established in the simulated world. Those companies unlucky enough to miss opportunities or unable to receive high quality bids, will eventually leave the platform and stop paying because they will not see any benefit in paying without getting any contract. Whether we want it or not, this is a common behaviour in any user, in any company, and in any market.

This dynamism allows us to be more realistic about what we could expect with current business models. It also helps us to determine the minimum number of users we need to meet the operation cost of the DIGICOR platform. Moreover, when the simulation uses the market size (number of manufacturers and suppliers) of our use cases, we can see whether there could be revenue indeed or whether the operation cost has to be minimised according to the target market size.

Further work along this line includes adding more specific DIGICOR outcomes/tools into the simulation so that business interactions based on those tools affect the acquisition of contracts and the decision to remain in DIGICOR as a member and keep on paying. The expected output



of this work is a revenue prediction on each tool, so that we can say, "this tool is more tuned for this or that market".

One drawback of this type of work is that "all [simulation] models are wrong, but some are useful" (G. Box, 1978). This statistics principle stipulates that no matter the level of detail we add in our simulation models we will still not be capturing the whole reality. But all we need from a simulation is only a hint that we are moving in the right direction.

# DIGICOR partners

